



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/668,975	09/23/2003	John C. Kralik	10010938-1	1754
57299	7590	08/22/2006	EXAMINER	
AVAGO TECHNOLOGIES, LTD. P.O. BOX 1920 DENVER, CO 80201-1920			BOUSIKARIS, LEONIDAS	
			ART UNIT	PAPER NUMBER
			2872	
DATE MAILED: 08/22/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/668,975	<b>Applicant(s)</b> KRALIK ET AL.	
	<b>Examiner</b> Leo Boutsikaris	<b>Art Unit</b> 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 July 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8, 10-23 and 26-30 is/are pending in the application.
- 4a) Of the above claim(s) 1-7 and 17-23 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11-12, 26-30 is/are allowed.
- 6) ☒ Claim(s) 8, 10 and 13-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Objections***

Claims 13-14 are objected to because of the following informalities:

Claim 13 is dependent from claim 9, which has been canceled. It will be assumed that claim 13 is depended from claim 8, instead.

In claim 14, line 5, the word “patterned” should be changed to “tiled” to cure lack of antecedent basis.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8, 10, 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Birdwell (US 5,877,876) in view of Wu (US 5,946,116).

Regarding claim 8, Birdwell discloses an optical switching/routing system comprising (Figs. 17A, 17B);

a polarization separating sub-system (232A, 234A, 236A) capable of separating an input optical beam 244 into a first optical beam of a first polarization and a second optical beam of a

Art Unit: 2872

second polarization distinct from the first polarization, and emitting a first emitted optical beam of a third polarization (at the output of the top half of the beamsplitter 232A) and a second emitted optical beam of the same third polarization (at the output of the reflecting prism 236A, and after passing through half-wave plate 234A), said emitted first and emitted second optical beams constituting an input channel of said third polarization;

a polarization recombining sub-system (232B, 234B, 236B); and

a grating based selectable switching/routing sub-system (230A, 246, 230B) including at least one pixilated switchable component, said sub-system interposed optically between said polarization separating sub-system (232A, 234A, 236A) and said polarization recombining sub-system (232B, 234B, 236B); and

said selectable switching/routing sub-system capable of switching/routing said input channel to an output channel of a fourth polarization, said output channel constituting a pair of output beams of said fourth polarization (said two beams being one at the input of reflecting prism 242B, and the second one being at the input of beamsplitter 232B);

said polarization recombining sub-system capable of recombining said pair of output beams of said fourth polarization into a final output beam of combined polarization entering output fiber 240B (line 39, col. 18 to line 18, col. 19, lines 7-26, col. 20). It is noted that “234B” in Fig. 17b should be “230B”, based on the above discussion.

However, in Birdwell’s system, the polarization separating sub-system comprises a polarization splitter 232A followed by a half-wave plate 234A, i.e., said system lacks a tiled polarization converter used in conjunction with the polarization splitter. Wu discloses an optical switching/routing system (Fig. 5a), wherein at the input end, a birefringent element 30 splitting

Art Unit: 2872

an input beam into two beams of different polarization is followed by a tiled polarization converter 100, whose one region receives one of the outputs of the birefringent element and outputs a beam with different polarization and another region receives the other one of the outputs of the birefringent element and outputs a beam without changing the polarization (lines 5-10, col. 7). It is noted that the polarization converter 100 is a “tiled” element since it comprises two sub-units, each having different optical properties. It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the combination disclosed by Birdwell (i.e., polarization beam splitter in conjunction with a half-wave plate) with the combination taught by Wu (i.e., birefringent element in conjunction with tiled polarization converter) for producing a pair of separated optical beams with the same polarization, since the pair of beams at the output of the polarization splitter taught by Wu are closer in space compared with the polarization splitter taught by Birdwell because of the geometry of the utilized optical elements, thus resulting in a more compact optical system. Furthermore, both systems constitute analogous art in addition to solving the same problem, namely, producing two optical beams having the same polarization.

It is also noted that the optical switching/routing system depicted in Fig. 5a of Wu is the same as the claimed system, except that the selectable switching/routing subsystem is not based on diffractive gratings.

Regarding claim 10, the polarization recombining sub-system comprises a half-wave plate polarization converter 234B (which is not tiled) and a polarization combiner 232B. It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the combination disclosed by Birdwell (i.e., polarization beam splitter in conjunction

Art Unit: 2872

with a half-wave plate) with the combination taught by Wu (i.e., birefringent element in conjunction with tiled polarization converter) for exactly the same reasons given above.

Regarding claim 13, the third polarization is the same as the first polarization.

Regarding claim 14, the combination birefringent element/polarization splitter 30 followed by the tiled polarization converter 100 in Wu is such that the birefringent element 30 splits an input beam into two beams of different polarization, and wherein the patterned polarization converter 100, comprises one region that receives one of the outputs of the birefringent element and outputs a beam with different polarization and another region that receives the other one of the outputs of the birefringent element and outputs a beam without changing the polarization (lines 5-10, col. 7).

Regarding claim 15, the fourth, third and first polarizations are all the same.

Regarding claim 16, the analysis made in conjunction with claim 14 applies, since the polarization separating sub-system is completely the same as the polarization recombining sub-system, with the two sub-systems being completely symmetrical with respect to an axis intersecting normally element 224 at the middle point (see Fig. 17B).

#### ***Allowable Subject Matter***

Claims 11-12, 26-30 are allowable over the prior art of record for at least the reason that even though the prior art discloses optical switching systems incorporating polarization-based separating and recombining sub-systems positioned on either end of a grating-based selectable switching/routing sub-system as well as a polarization-based separating/combining system comprising a pair of holographic gratings positioned in series, the prior art fails to teach or

Art Unit: 2872

reasonably suggest, regarding claims 11-12, an optical switching/routing system comprising a polarization splitter/combiner and a patterned polarization converter, where the polarization splitter/combiner comprises a pair of polarization splitter/combiner gratings, and regarding claims 26-30, a polarization separating/combining system comprising a patterned polarization converter optically coupled to first and second gratings of the pair of the polarization sensitive gratings, as set forth by the claimed combination.

### ***Response to Applicant's Arguments***

Applicant's arguments filed on 7/3/2006 have been fully considered but they are not persuasive.

Applicant argues that Wu does not disclose a tiled polarization converter. Examiner cannot agree. Polarization converter array 100 is clearly a tiled optical element comprising two separate sub-units, each having different optical properties, and furthermore producing exactly the same result as the claimed tiled polarization converter. Finally, there is strong motivation to combine the completely analogous references of Birdwell and Wu.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

Art Unit: 2872

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Leo Boutsikaris whose telephone number is 571-272-2308. The examiner can normally be reached on M-F, 10-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

**LEONIDAS BOUTSIKARIS**  
**PRIMARY EXAMINER**



Leo Boutsikaris, Ph.D., J.D.  
Primary Patent Examiner, AU 2872  
August 18, 2006